REMARKS

Applicants gratefully acknowledge the Examiner's indication that claims 113 and 123 contain allowable subject matter. However, Applicants respectfully traverse the remaining claim rejections as follows.

1) The objection to claim 119 and 109: Claim 119 has been amended to correct the typographical error with respect to the term "equilibrated mixture." Applicants note that claim 109 had already been corrected in the July 25, 2005 response to provide the missing "that" noted in paragraph 2 of the 10/24/05 office action.

2) The rejection of claims 109 – 124 as being indefinite for failing to particularly point out and distinctly claim the subject matter applicant regards as his invention

Applicants respectfully note that paragraph 3 of the 10/24/05 office action provides a rationale for this rejection only as to claims 118, 110, and 112. These claims are cancelled, thereby mooting their rejections. Applicants are at a loss to respond to the rejection of the remaining claims since no reasoning was provided as to how these remaining claims could possibly be indefinite. In that regard, Applicants can only respond that, indeed, the remaining claims are perfectly definite. Moreover, Applicants note that MPEP § 2173.02 mandates that "[examiners] are encouraged to suggest claim language to applicants to improve the clarity or precision of the language used, but should not reject claims or insist on their own preferences if other modes of expression selected by the applicants satisfy the statutory requirement." Furthermore, MPEP § 2173.04 notes that claim breadth per se is not indefiniteness. Here, Applicants have invented an entirely new genre of mass spectrometry genre. Applicants thus have the statutory right to claims with suitable breadth to cover such an innovation.

In an effort to bring this case to allowance, however, claim 109 has been amended to include the sample extraction module such that claim 110 is now cancelled. Moreover, the spike dilution apparatus has been amended to provide a known volume of diluted spike. Support for such a limitation is plainly given by Applicants Figure 6 and the supporting discussion such as on page 32, line 14.

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3) The rejection of claims 119-124 as being incomplete for omitting essential steps.

Applicants respectfully note that paragraph (4) of the 10-24-05 office action is completely silent in responding to Applicants' arguments with regard to this rejection in the July 25, 2005 response. In that regard, Applicants point out that MPEP 707.07(f) notes that if an Examiner repeats the rejection (as was done here), that the Examiner should "take note of the applicant's argument and answer the substance of it." In any case, Applicants note that the quoted portion of the specification (page 30, lines 22-27) plainly shows that Applicants were simply discussing a preferred embodiment of the invention. In particular, the quotation begins with "[it] is necessary in embodiments of the invention that..." Note carefully that Applicants did not say "It is necessary in all embodiments of the invention..." Indeed, this quotation is merely a best mode disclosure – as set forth in MPEP § 2165, an applicant need merely disclose the best mode: There is absolutely no statutory requirement that an applicant's claims be limited to the best mode. Accordingly, Applicants respectfully traverse this ground of rejection as being unsubstantiated.

4). The rejection of claim 109 – 112, 118 – 120 and 122 as being unpatentable over Marchante-Gayon, Rottman, or Viczian in view of Waygood and Godec or May and Stewart or Schramel.

Before traversing these rejections in detail, Applicants note the following claimed features: For the first time in the history of mass spectrometry, a closed loop in-process mass spectrometry system has been developed that allows the automated characterization of constituents and trace elements in solutions. By "closed loop," Applicants are referring to the fact that not only are samples automatically drawn and characterized in a mass spectrometer, a spike is also automatically diluted and mixed with the sample prior to processing through the mass spectrometer. Because the spike concentration is known (even after dilution), a ratio response may be used to automatically characterize the amount of an analyte in the sample. As disclosed by the Applicants, the spike may be one that alters an isotopic ratio (an IDMS spike) or it may be a chemical homologue spike

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– for example, as stated by the Applicants on page 35, the invention includes numerous other embodiments that do not use the IDMS technique. For example, as stated on lines 8 – 11 of that page: "in some cases addition of standard concentrations of monoisotopic elements, that is, elements that do not exhibit a plurality of isotopes in the natural state, may be used in many procedures." For this reason, Applicants noted that their apparatus may be used to analyze for concentrations of Co and Mn on page 21, lines 4 through 10, both of which are virtually monoisotopic such that IDMS techniques cannot be used: there is no naturally-occurring isotopic ratio to alter for such elements.

A ratio measurement not using IDMS would involve the well-known internal standard technique. In that technique, the sample is spiked with a known concentration of an internal standard that chemically behaves sufficiently similar to the analyte of interest in the sample such that by comparing the mass/charge response for the analyte to the mass/charge response for the internal standard, the concentration of the analyte may be determined.

Regardless of the type of ratio being used, the beauty of this invention is that instrument drift and other inaccuracies are naturally cancelled by the ratio measurement.

These advantageous features are reflected in claim 109. For example, claim 109 recites "a control system adapted to automatically configure the sample extraction module, the spike dilution apparatus, the mixer, the API, and the mass spectrometer such that the sample is automatically extracted, mixed with the processed spike, ionized, and processed by the mass spectrometer, the control system being further configured to use the ratio measured by the mass spectrometer to characterize the concentration of the at least one analyte in the extracted sample."

Given this background, the "base" references of this rejection will be discussed first, followed by the "in view of" references.

The Base References:

The Marchante-Gayon reference merely discloses the use of a manually-operated ICP-MS apparatus. Applicants readily admit such an apparatus is abundantly in the prior art. The sole "automation" disclosed by Marchante-Gayon is the use of a two-channel peristaltic pump to continuously pump Mo spike through a first channel and alternatively one of either the sample or a naturally-occurring stock solution of Mo through a second

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channel. The spike solution is manually diluted. There is thus no suggestion or teaching whatsoever for a spike dilution apparatus coupled to a spike reservoir as recited in claim 109. Moreover, there is no teaching or suggestion for the use of an atmospheric pressure ionizer (API). Finally, there is no teaching or suggestion for a control system "adapted to automatically configure the spike dilution apparatus, the mixer, the API, and the mass spectrometer such that the sample is automatically mixed with the processed spike, ionized, and processed by the mass spectrometer, the control system being further configured to use the ratio measured by the mass spectrometer to characterize the concentration of the at least one analyte in the extracted sample."

The Rottmann reference also discloses the use of a manually-operated ICP-MS apparatus. Applicants again readily admit such an apparatus is abundantly in the prior art. Moreover, Applicants note that the "on-line" characterization of the Rottmann apparatus is misleading in that the "on-line" feature merely refers to the use of a flow injection analysis tool to mix spike and sample together. Note that this mixture is imprecise compared to Applicants – Rottman continually flows sample and spike together. There is no extraction of a known volume of spike in Rottman nor is there an provision of a known volume of diluted spike. More fundamentally, once Rottman has his vat of mixed spike and sample, the remaining procedure is manual. Thus, the Rottmann reference provides no teaching or suggestion for a single limitation of claim 109.

The Viczian reference is cumulative to Rottman in that they are both directed to this use of flow injection analysis to continually mix sample and spike. There is no teaching or suggestion in Viczian to extract a known volume of sample (instead, just a known flow rate). Similarly, there is no teaching or suggestion in Viczian to provide a known volume of diluted spike (instead, just a known flow rate of spike). More fundamentally, once Viczian has his vat of mixed sample and spike, the remaining procedure is manual. In sum, Marchante/Rottman/Viczian do not provide any teaching or suggestion for a single limitation in claim 109.

The "in view of" references:

The Waygood reference is merely directed to an optical emission spectrometry system. This is an "open loop" technique in that there is no spiking. Instead, an optical

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emission result is compared to previously-obtained calibration curves. Indeed, Waygood discusses the need for "restandardization" every 8 hours in bold on his cover page (p. 64). Thus, on page 67 Waygood notes that at "fixed intervals chosen by the operator, during automatic routine analyses, a series of standard solutions covering the range of process fluids, each containing the internal standard is analyzed." As such, the sole relevance Waygood has is to the spike extraction module of claim 109. That is it. There is no teaching or suggestion in Waygood for the claim elements of a spike dilution apparatus, the mixer, the atmospheric pressure ionizer, the mass spectrometer, and the control system.

The Godec reference adds nothing further in that it is merely directed to the use of a "Total Organic Carbon" (TOC) analyzer. As known in the art, such techniques involve converting all the carbon in a sample to CO_2 and then using spectrophotometry to measure the CO_2. Applicants note that Godec does use an "automatic dilution apparatus" to dilute the sample before the TOC analysis. In that regard, Applicants note they are not claiming just "an automated device" or "automated dilution." As such, Godec's only possible relevance is towards Applicant's spike dilution module. However, Godec fails even with regard to this single limitation in that Godec's dilution module (see Figure 2) provides a constant stream of diluted sample – there is no provision of a known diluted volume as required for the claimed spike dilution module.

The May reference is also irrelevant to the claimed subject matter. All that May teaches is the use of an autodiluter to dilute sample prior to analysis by a mass spectrometer. As stated previously, Applicants are not claiming "automated dilution." Moreover, the May reference even fails with respect to its only possibly relevant limitation, that of the spike dilution module. Specifically, there is no teaching or suggestion for the use of the May autodiluter to dilute spike.

The Stewart reference is merely directed to the use of electrospray mass spectrometry to investigate chromium speciation. Applicants readily admit that they do not seek claims to "electrospray mass spectrometry," that apparatus being in the prior art. The Stewart reference provides no teaching or suggestion for the automated system recited in claim 109.

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Finally, the Schramel reference is merely directed to the use of capillary electrophoresis with electrospray mass spectrometry. Applicants readily admit that they do not seek claims to either "capillary electrophoresis" or the combination of this technique with electrospray mass spectrometry. The Schramel reference provides no teaching or suggestion for the automated in process mass spectrometry of claim 109.

Applicants respectfully submit that a prima facie case of obviousness has never been established in this case. Instead, a hodge-podge of assorted prior art references are cited one after another. It is left to the Applicants (at considerable attorney cost and prejudice) to guess at the relevance of all these references. In that regard, Applicants once again stress that they are not claiming "total automation as taught by Waygood." (see page 7 of the Office Action, second-to-last paragraph). Instead, they have set forth a number of elements in claim 109 that function together to provide a closed-loop in process mass spectrometry system as described above. In particular, Applicants note that, despite the repeated office actions in the present application, no teaching or suggestion has ever been provided for the controller element. Evidently, that is somehow made obvious because through an unexplained parsing and/or combination of the cited references.

Claim 119 is patentable for analogous reasons. Accordingly, all the pending claims are allowable because claims 109 and 119 are the sole independent claims.

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CONCLUSION

For the foregoing reasons, Applicant respectfully submits that the pending claims are in condition for allowance.

If there are any questions regarding any aspect of the application, please call the undersigned at 949-752-7040.

Certification of Facsimile Transmission

I hereby certify that this paper is being facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Jonathan Hallman — March 24, 2006 Date of Signature

Respectfully submitted,

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